A.D. 1875, 28th June. N° 2675.

SPECIFICATION

OF

JOHN HANSON.

TREATING SEWAGE.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:
PUBLISHED AT THE GREAT SEAL PATENT OFFICE,
25, SOUTHAMPTON BUILDINGS, HOLBORN.
1875.

A.D. 1875, 28*th* JULY. N° 2675.

Treating Sewage.

LETTERS PATENT to John Hanson, of Savile Town, near Dewsbury, in the County of York, Manufacturing Chemist, for the Invention of "IMPROVEMENTS IN THE TREATMENT OF SEWAGE, AND IN THE MANUFACTURE OF MANURE THEREFROM."

Sealed the 6th October 1875, and dated the 28th July 1875.

PROVISIONAL SPECIFICATION left by the said John Hanson at the Office of the Commissioners of Patents, with his Petition, on the 28th July 1875.

I, JOHN HANSON, of Savile Town, near Dewsbury, in the County of York, Manufacturing Chemist, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN THE TREATMENT OF SEWAGE, AND IN THE MANUFACTURE OF MANURE THEREFROM," to be as follows :—

This Invention relates to improvements in the treatment of sewage and in the manufacture of manure therefrom.

In carrying my Invention into practice for the precipitation of the sludge from each 100,000 gallons of sewage water I take of slacked lime (say) about 20 or 23 lbs. and of black ash about 30 lbs., and of soot

about ½ lb. (the two latter being the residuum from alkali works), and these precipitating ingredients I thoroughly grind, mix, and incorporate together and run them into the supply pipe from the sewage pumping well to the settling tanks or otherwise so as effectually to mix them with the sewage mass as or before it passes into the settling tanks for precipitation. I then for the manufacture of manure from the precipitated sludge or sewage residuum mix or blend therewith fine dry ashes, sand, sawdust, waste from flax mills, husks from seeds, or any other suitable effective absorbent, the principle of this part of the Invention being the absorption, in contradistinction to the usual drying or evaporating, of the liquid or moisture from the sludge or sewage residuum without reference to the employment of any specific absorbent material or substance, though I may mention that at present I find fine dry ashes the most suitable.

The process described of effecting the precipitation of the sludge is most efficient, the foulest of waters being purified by the precipitation of all foreign or deleterious sludge particles at the least cost, and the method or process described of treating the sludge by absorption does not require the use of costly machinery, and allows of all the valuable fertilizing properties the sludge contains being retained, whereas by the methods at present employed of treating the sludge, that is, by drying or evaporation, a large per-centage of these valuable properties are lost; and, moreover, the manure is rendered by my process inodorous and dry, and can be packed in bags and warehoused and conveyed as ordinary merchandize, and can thus be more generally retailed and sold, and it is also rendered of greater value (for certain crops being the best kind of manure), and is especially adapted for use on heavy land, as it renders the soil more friable and capable of being more easily worked, and in my treatment I am further enabled to utilize two (otherwise) waste products, viz^{t}., the black ash from alkali works and the fine ashes, both which products at present are from their non-utility and accumulation a source of great expence to provincial towns and other places.

For the sludge there has hitherto been but little or no market, the cost of drying or evaporating the moisture therefrom being very expensive, and in many large towns at present it is otherwise disposed of (after the necessary process of precipitation) by being buried in deeply dug trenches, wherein it never dries.

Hanson's Improvements in Treating Sewage.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said John Hanson in the Great Seal Patent Office on the 24th December 1875.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JOHN HANSON, of Savile Town, near Dewsbury, in the County of York, Manufacturing Chemist, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-eighth day of July, in the year of our Lord One thousand eight hundred and seventy-five, in the thirty-ninth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said John Hanson, Her special licence that I, the said John Hanson, my executors, administrators, and assigns, or such others as I, the said John Hanson, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN THE TREATMENT OF SEWAGE, AND IN THE MANUFACTURE OF MANURE THEREFROM," upon the condition (amongst others) that I, the said John Hanson, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said John Hanson, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement in writing, that is to say :—

This Invention relates to improvements in the treatment of sewage for the precipitation of foreign particles, commonly called sludge, suspended therein, and in the subsequent manufacture of a portable inodorous and dry manure from the precipitate obtained from such sewage.

Once our streams and rivers were pure, but now most of them are the receptacles of sewage filth flowing from our villages, towns, and

cities, causing pestilence and a high death rate, at the same time robbing the land of the best fertilizing properties. Many plans have been tried to clarify these waters and recover the manure in the form of residuum; however, most of these plans have failed, and those that have partially succeeded are too complicated, ponderous, and expensive.

Irrigation would seem the most natural, but such a town as Leeds or Bradford would require a Yorkshire for irrigation land. Precipitation then seems to me to be the only plan to be adopted, as it can be accomplished in a comparatively small space.

The precipitations hitherto tried have been the results of expensive chemicals, which have to be manufactured, and as the value of an article is what it will fetch, the question arises to local boards and corporations what will be the price of these chemicals supposing all local boards and corporations were obliged to use them. Already the cost of precipitation with such chemicals at their present prices is something fabulous, and has caused large towns to look forward with dread to the time when an injunction will compel the clarifying of their sewage and foul rivers and streams.

Chemistry so wonderful, and which is getting daily more developed, has dawned with a new light upon agriculture, and is destined to create a revolution in the supply of food for plants and roots, &c. It seems strange that our country, so densely populated, should hitherto have been dependent on foreign countries for fertilizers and manures, such as bones, horns, hoofs, guano, and the like, when we have at home as waste and encumbrances the very ingredients the bones and other manure materials possess, therefore instead of polluting our noble rivers and streams, destroying the fish and breeding pestilence in our towns, the contents of our sewers and drains must be transferred to the land, exalting the fertility of that which is now under culture and redeeming that which has hitherto been considered as hopelessly sterile.

When we reflect and search for the cause of rinderpest, foot and mouth disease, and other pestilential maladies, is it not natural to suppose that such pestilences have been conveyed here by or in the foreign products spoken of. We know not the state of health the animals were in before death, nor whether all the animals that supply the bones, &c., have been slaughtered or have died a natural death. Our knowledge of the immense guano beds shew us clearly that millions of

birds have died a natural death, it may be by long age, starvation, or disease. The same can be supposed of the bone supplying animals, therefore I am convinced that diseases are from these sources imported into our country. The manures are spread upon our fields, our plants feed upon those manures, and our cattle feed upon those plants, thus acquiring diseases that were previously foreign to them.

From a sanitary and commercial point we find that the importation of manures is an evil, and must be discontinued, especially when we are continually making millions of tons of manure hitherto wasted, the residuum of sewage and foul water.

In carrying my Invention into practice for the precipitation of the sludge from each one hundred thousand gallons of sewage water (and this part of my Invention is also applicable to the precipitation of all foreign deleterious or poisonous particles or matter suspended in foul waters, such as those issuing from dye works and other factories or works in order to effect their purification), I take of slacked lime (say) about 20 to 23 lbs., and of soot or of flue dust about $^1/_2$ lb., and of black ash about 30 lbs. (the last-named ingredient being the residuum from alkali works), and these precipating ingredients (the proportions of which may vary) I thoroughly grind, mix, and incorporate together, and I make them into a cream-like paste and run them as thus combined into the supply pipe forming the communication between the sewage pumping well and the settling tanks, or otherwise in the most practicable form, so as effectually to mix with the sewage mass as or before it passes into the settling tanks for precipitation.

I employ these precipitating ingredients preferentially because they combine the advantages of being comparatively inexpensive, and as being among the best precipitants and deodorizers known, the lime giving a clear transparent effluent, the brackishness of which, owing to the suspended hydrate of lime, which would render it unfit for manufacturing or domestic purposes) is effectually neutralized by the carbonizing effect upon the lime of the black ash, which latter is a most powerful absorbent of oxygen, and the carbonic acid gas collected by the lime is also thus set free, and the water is consequently neutralized and restored to its natural state of purity. Moreover the black ash (from such works as above mentioned) contains about 90 soluble salts and about 10 of charcoal and earths. These salts contain muriate of soda and potash, sulphate of potash and muriate of lime, and also

magnesia, therefore the effluent water is not only carbonized, but there is added to the precipitate (subsequently to the manure) the above most valuable and essential fertilizing salts. From the use of the soot in addition to the advantages derived as a precipitant is also obtained the very fertilizing sulphate and carbonate of ammonia.

I would here remark that in some cases it may answer to make use of only one or two of the above-named ingredients.

Subsequently for the manufacture of manure from the sludge of the sewage by these means and thus precipitated I mix or blend therewith fine ground or sifted, or powdered, or pulverized, and preferably dry coal ashes or soot or flue dust, as effective absorbents, either combined or separately, or sometimes only the ashes may be required, the principle of this part of the Invention being the absorption, in contradistinction to the usual drying or evaporation, of the liquid or moisture in and from the sludge or sewage residuum. I may here mention that for this specific purpose I prefer to employ the fine dry coal ashes, as being the most effective and suitable, and as being cheap, and waste products, and as they contain sulphate of lime, charcoal, and other matters which possess most valuable powers of deodorization, and of the absorption of carbonic acid and nitrogen gases, and they also aid in fixing the ammoniacal and other volatile and fertilizing salts, and are continual collectors from the surrounding air of nitrogen, which constitutes the most nutritious food and component of plants, and thus from the treatment and combination of the two previously waste materials, though costly encumbrancers, the coal ashes and the sludge (both herein-after more particularly referred to), I render them at once useful and profitable, and obtain from them a very valuable manure.

Thus the process firstly described of effecting the precipitation of the sludge (or deleterious matters in suspension) is most efficient, the foulest of waters, including those from dye or colour works, or mills, or other manufactories being purified at the least cost without the use of expensive manufactured chemicals; and the method or process secondly described of treating the sludge by absorption does not necessitate the use of costly machinery, and allows of all the valuable fertilizing properties that the sludge contains being retained; and, moreover, the manure is rendered inodorous and dry, and can be packed in bags, and can also be warehoused and conveyed as ordinary merchandise, and thus be more generally retailed and sold, and rendered of a greater value (for

certain crops being the best kind of manure), and especially adapted for use on heavy land, as it will render the soil more friable and capable of being more easily worked. I am further enabled to utilize the otherwise waste black ash from alkali works, and fine coal ashes, both which products at present are from their non-utility and daily accumulation upon land purposely bought, and therefore lost to more useful purposes, a source of great expence to provincial towns and other places, and to profitably dispose of the sludge, for which there has hitherto been but little or no market, the cost of drying or evaporating the moisture therefrom causing the loss of a large per-centage of valuable fertilizing properties, and being so very expensive that in many large towns it is disposed of (after the previous necessary process of precipitation) at a complete loss and at great expence by being stored in deeply dug trenches, wherein it never dries.

According to this Invention, which can be equally as well applied on a large as on a small scale, the entire cost of dealing with twelve millions of gallons of sewage per day and the manufacture of manure therefrom will be but about nine thousand pounds per annum, and supposing the manure to sell at the exceedingly low sum of six shillings per ton, eighteen thousand pounds would be realized, and thus there would be a yearly profit of nine thousand pounds.

Having now particularly described and ascertained the nature and object of my said Invention, together with the manner in which the same is to be or may be performed or carried into practical effect, I would remark in conclusion that I claim as my Invention the novel and peculiar method or means of treating sewage or foul water by precipitating the sludge suspended therein, and the manufacture of a readily portable inodorous and dry manure therefrom, substantially in the manner and according to the improved processes as herein fully specified and described.

In witness whereof, I, the said John Hanson, have hereunto set my hand and seal, this Sixteenth day of November, in the year of our Lord One thousand eight hundred and seventy-five.

JOHN HANSON. (L.S.)

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1875.